WORLD RECORD HOLDER
ZAP
World Solar Bike Race

$2.00
REV 5/15/00

ZAP!

OWNER'S MANUAL DX

ZAP POWER SYSTEM
MADE IN THE USA

Patent #5,491,390 #5,671,821 • Other Patents Pending

ZAPWORLD.COM

where transportation is going

One ZAP Drive •117 Morris Street • Sebastopol California 95472 U.S.A.
tel (707) 824-4150 • fax (707) 824-4159
e-mail: zap@zapworld.com • Stock Symbol:ZAPP

©2001 ZAPWORLD.COM. All Rights Reserved. ZAP® is a registered trademark.

BE SAFE! Always wear a helmet when riding

YOUR INSURANCE POLICIES MAY NOT PROVIDE COVERAGE FOR ACCIDENTS INVOLVING THE USE OF THIS BICYCLE. TO DETERMINE IF COVERAGE IS PROVIDED, YOU SHOULD CONTACT YOUR INSURANCE COMPANY OR AGENT.

BEFORE YOU ZAP YOUR BIKE!

IMPORTANT! PLEASE READ CAREFULLY:

SINCE YOUR EXISTING INSURANCE POLICY MAY NOT PROVIDE COVERAGE FOR ELECTRIC BICYCLES, YOU SHOULD CONTACT YOUR INSURANCE COMPANY OR INSURANCE AGENT TO DETERMINE IF COVERAGE IS PROVIDED.

ALONG WITH YOUR KIT, WE'VE INCLUDED AN INVOICE, OWNER'S MANUAL, AND A WARRANTY FORM. PLEASE READ THE WARRANTY CAREFULLY AND **FILL OUT THE FORM ON THE BACK. YOU MUST MAIL THE WARRANTY FORM WITHIN 10 DAYS OF RECEIVING YOUR ZAP POWER SYSTEM IN ORDER TO ACTIVATE THE WARRANTY.**

Introduction

Congratulations on your purchase of a ZAP Electric Bike or Power System. In the coming years you will find many ways to use your ZAP — commuting, exercise, errands, or simply for fun!

Welcome to the world of ZAP electric Bikes!

- Is clean, non-polluting and in traffic, faster than your car.
- Costs only pennies in electricity. For fresh air and **fun!**

ZAP puts you at the forefront of a worldwide movement in transportation. A ZAP Electric Bike is appropriate technology for many of the problems that face our society today and in the years to come. Since virtually all of the world's one billion bicycles are upgradable with a ZAP, it is truly an invention that can change the world. The global population is increasing at an alarming rate, and the future seems to promise only more traffic congestion and air pollution. ZAP is an entirely new transportation option that combines the environmental friendliness of a bicycle and the convenience of a gasoline vehicle without the pollution.

For just a few pennies of electricity, your ZAP can replace you car for short trips; trips that make up most of peoples' daily transportation and cause most of our air pollution. Your ZAP can even be quicker than a car in some instances. Leave your car at home and ride your ZAP!

Not only will you get more exercise, fresh air and fun, but you can feel good because you are doing something positive for the planet. Imagine that...all this in one small, elegant ZAP bicycle system.

We have designed our electric bicycle system for simple, easy installation and operation.

Keep in mind that improper installation and operation of the ZAP can reduce your performance and your overall enjoyment, so before you start we strongly recommend the following: Familiarize yourself with your owner's manual. Carefully follow each step in the installation to assure a proper fit and installation. Just a little extra time reading your manual now can help you avoid frustration in the future.

Our Customer Service department is available between 9:00 a.m. and 4:30 p.m. PST, Monday through Friday at **(707) 824-4150** to help you with any problems that may occur. You can also e-mail your customer service questions 24 hours a day, seven days a week to: **zap@zapworld.com**.

Once again, thank you for purchasing a ZAP. Our hope is that you will like it so much, it will become your favorite mode of transportation.

Table of Contents

BEFORE YOU BEGIN 1

INTRODUCTION 2

TABLE OF CONTENTS 3

DESCRIPTION OF SYSTEM 4

DETAIL OF ZAP POWERBIKE 5

RE-ASSEMBLY INSTRUCTIONS (FOR PRE-ASSEMBLED ELECTRICRUIZERS®) 6-7

EASY INSTALLATION GUIDE 8-9

ENGAGEMENT LEVER OPERATION 10

OPERATION MANUAL & CHARGING GUIDE 11

SAFETY WARNINGS 12-13

PRE-RIDE CHECKLIST 14

BATTERY CARE 15

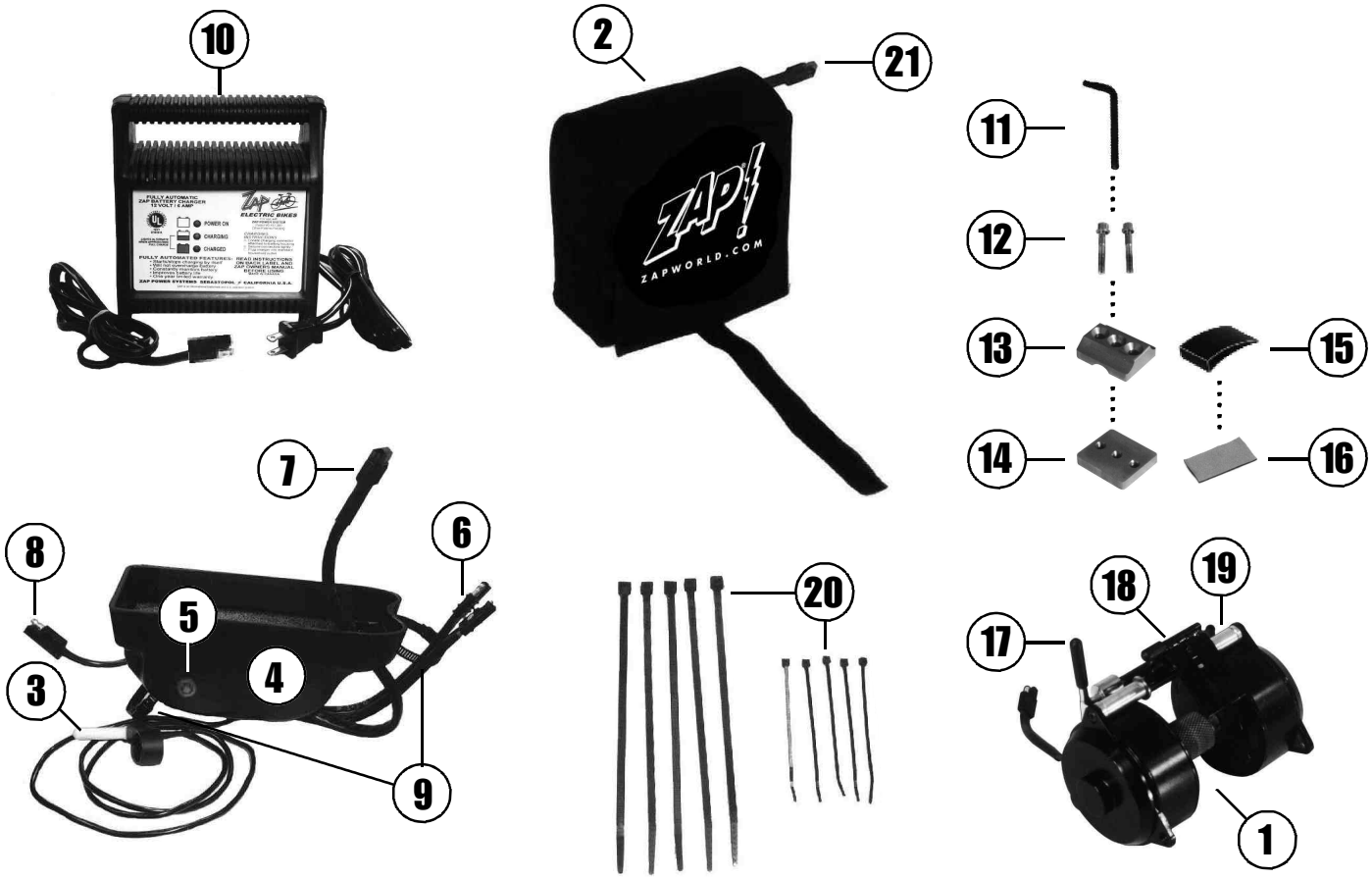
TROUBLESHOOTING GUIDE 16

TORQUE RATINGS 17

WARRANTY FORM 17-18

Description of System

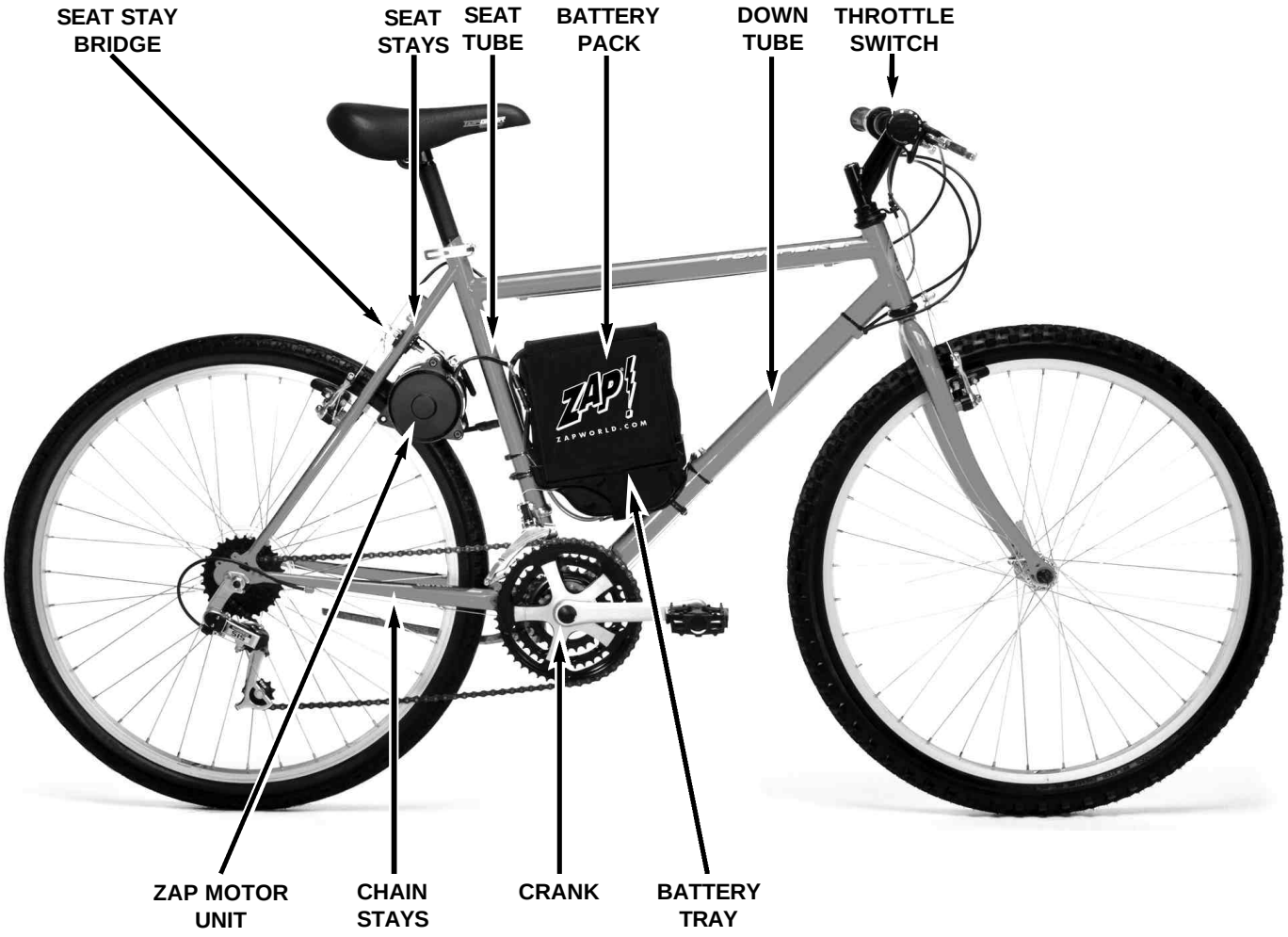
NOTE: *The items referred to on this page are important when installing your ZAP.*
Use this page as a reference guide.



1) ZAP Motor Unit
2) Battery Pack
3) Throttle Switch Assembly
4) Battery Tray
5) Main Power Switch
6) Motor / Controller Leads
7) Controller Power Connector
8) Auxiliary Power / Alternate Charging Jack
9) Worm Drive Clamps
10) Battery Charger
11) 4mm Allen Wrench*
12) Motor Mount Bolts
13) Bridge Mount*
14) Threaded Plate
15) Cam Ramp
16) Double-Sided Tape
17) Cam Lever
18) Hinge Bracket
19) Spacer Tube
20) Zip Ties
21) Battery Power Connector

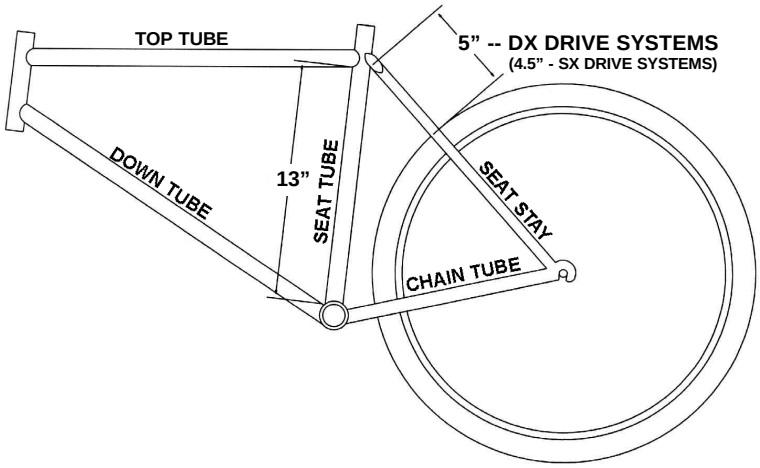
***not included in ZAP factory bikes with a welded bridge plate**

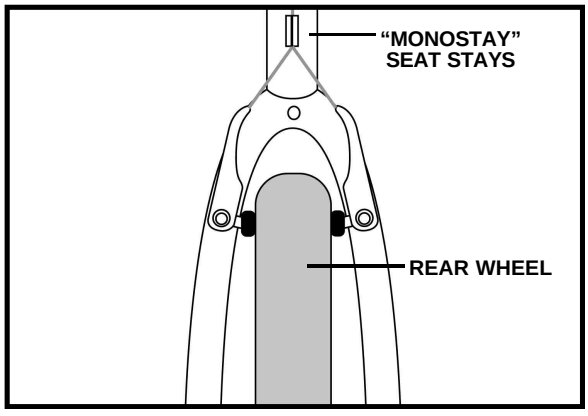
Detail of ZAP PowerBike®



MINIMUM FIT DIMENSIONS FOR ZAP POWER SYSTEM (TRAY MODEL)

Do not use ZAP System on bikes without metal seat stays!!!





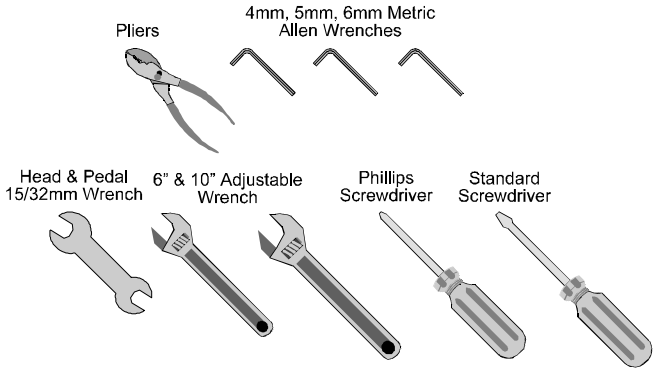
IMPORTANT! PLEASE NOTE

The standard ZAP Power System will not fit on a monostay bike.

RE-ASSEMBLY INSTRUCTIONS FOR A PRE-ASSEMBLED, BOXED ZAP ELECTRICRUIZER®

INTRODUCTION

Welcome electric bicycle owner! Thank you for purchasing your ZAP Electric Bicycle - we are confident that you will love it. The innovative ZAP Power System you have purchased will bring you many hours of fun and enjoyment. However, before you start enjoying your bike, some assembly is required. **We strongly suggest that your ZAP Electric Bike be assembled and tuned by a professional bike mechanic**. If you need assistance in working with a local bike dealer, please call ZAP @707-824-4150. In order to final assemble your electric bike, you will need the following nine simple tools:



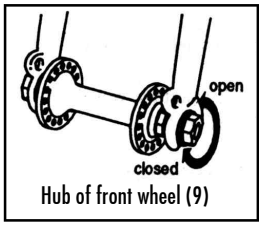
1) REMOVING PACKAGING

Carefully remove all packing material from bicycle and inspect the bike for any damages which may have occurred during shipping. If necessary, please call both the shipper and ZAP immediately to report any damage.

2) OWNER'S MANUALS

Before you begin assembly, **thoroughly read through** the ZAP Owner's Manual, ZAP Owner's Manual Supplemental, and this assembly sheet. **Review** page four of the ZAP Owner's Manual Supplemental. Please refer to the Torque Ratings Guide when tightening or securing bicycle parts. All bicycle parts referred to during assembly will have a number corresponding to the diagram appearing on this page.

3) FRONT WHEEL



Attach the front wheel to the forks with a 15mm wrench or an adjustable wrench. Tighten each side partially, center and balance wheel, then tighten completely.

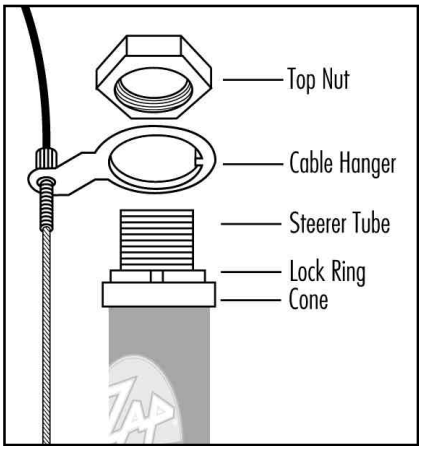
4a) SEAT & SEATPOST

Insert seatpost into the bracket on the underside of the seat. Be sure that the top of the seat is level. Securely fasten the seat to the seatpost using an adjustable wrench. Insert seatpost into the seat tube of bicycle so that the minimum insertion mark is no longer visible. A) If you have the standard binder bolt, using an allen wrench, securely tighten the seatpost enough so that you cannot twist the saddle out of alignment. B) If you have the optional quick release lever, tighten the quick-release nut enough so that you cannot twist the saddle out of alignment after the quick release is engaged.

4b) HOW TO FASTEN THE SEAT QUICK RELEASE

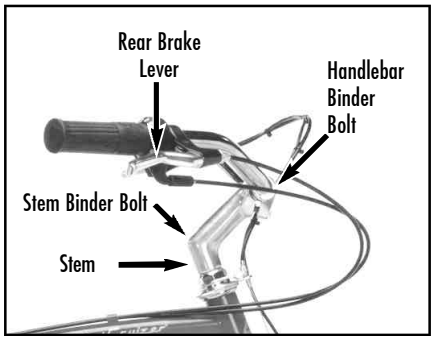
Open and close the quick release lever with your right hand while gradually tightening the adjusting nut (located on the opposite side of the seatpost) with your left hand in the clockwise direction. Continue tightening the nut until you feel resistance with your hand at the point when the lever is parallel to the seatpost. Grip the seatpost with your fingers and use the palm of your hand to close the lever with as much strength as possible. When closed, the lever must be in the "CLOSE" position. The side of the lever with the inscription "CLOSE" must be facing away from the seatpost.

5) FRONT BRAKE CABLE HANGER



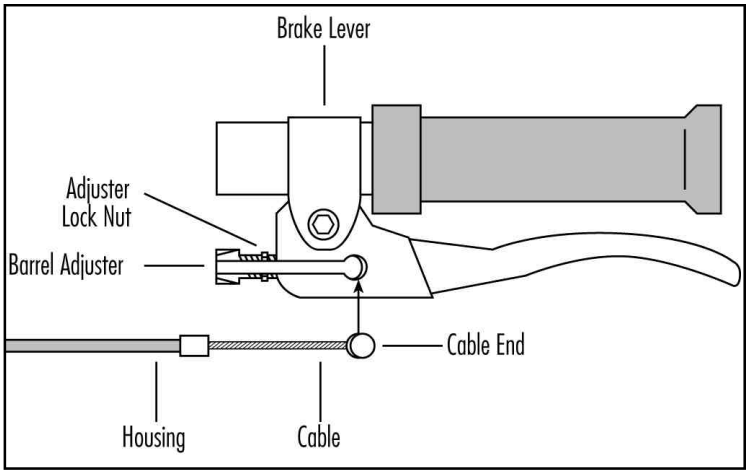
(*If you are also installing a ZAP PowerLight, the light bracket should be installed beneath the headset top-nut.*) Remove the top nut from the fork. While aligning the cable hanger's tooth with the groove on the steerer tube, slide the brake cable hanger onto the forks' steerer tube. Next, re-install the top nut, securing it with the proper torque specifications. After installing the front brake cable hanger, inspect the adjustment for the headset bearings. **If the fork does not turn freely**, first loosen by turning counterclockwise the top nut and then loosen the cone, then re-secure the top nut. **If the fork is too loose**, then loosen the top nut, tighten the cone, then re-secure the top nut. (Before you ride the bike, make sure that the brakes are properly adjusted).

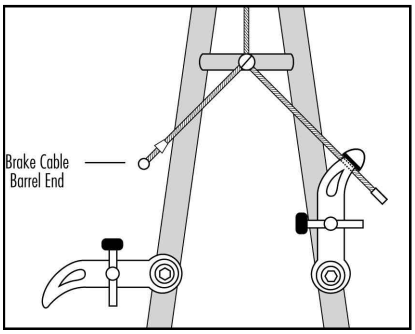
6) INSTALLING THE HANDLEBAR ASSEMBLY



Insert the stem into the bicycle head tube past the minimum insertion mark, align with front wheel, and tighten the stem binder bolt. Position handlebars at desired angle and tighten handlebar binder bolt The handlebars should be centered at the stem. Both binder bolts should be tightened with a 6mm allen wrench tight enough so that you cannot twist the stem and handlebars out of alignment. Adjust the brake levers to desired angles and tighten to proper torque.

7) CONNECTING THE REAR BRAKE CABLE

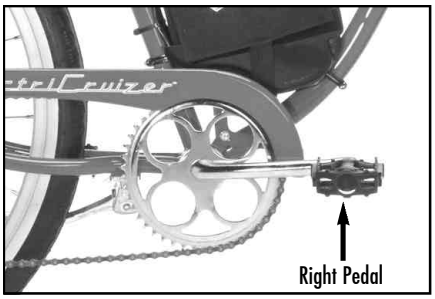




Step 1) At the rear brake assembly, located at the back wheel, unhook the rear brake cable barrel end. This made easier by squeezing the cantilever brakes towards the rim to decrease the cable tension in order to unhook the rear brake cable barrel end from the brake unit. Also make sure to screw (by turning clockwise) in the barrel adjuster all the way into the brake lever. (*This will make the brake wire easier to work with by increasing the slack in the brake cable*).
Step 2) On the rear brake lever, line up the slots on the barrel adjuster and adjuster locknut with the slots on the brake lever. Insert the brake cable into the brake lever. Turn the barrel so that the slots are no longer aligned.

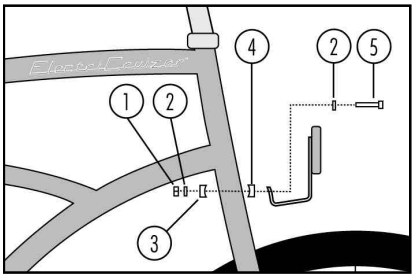
Step 3) Re-attach the brake cable to the rear brake assembly. (*Before you ride the bike, make sure that the brakes are properly adjusted*).

8) PEDAL INSTALLATION



Screw pedals into crank arms and tighten with a 15mm open-ended wrench to proper torque. The right pedal tightens clockwise and the left pedal tightens counter-clockwise.

9) REFLECTORS



1) **Nut** 2) **Washer** 3) & 4) **Beveled Washer** (only included in bikes that have the metal reflector bracket) 5) **Bolt**

Step 1) Inspect the rear reflector and reflector bracket to make sure that they are tight. The rear reflector should be perpendicular with the ground.

Step 2) Attach the front reflector bracket to the hole in the front fork crown. (*The front fork crown is located immediately above the front wheel*). Inspect the front reflector and reflector bracket to make sure that they are tight. The front reflector should be perpendicular with the ground.

10) TIRE PRESSURE

All ZAP bicycle tires should be inflated to the maximum recommended pressure printed on the tires. It is normal for bicycle tires to lose a little tire pressure every week. Since proper tire pressure is critical to the operation of your ZAP motor, please check your tire pressure weekly.

11) FINAL BICYCLE INSPECTION

Give your ZAP Electric Bicycle a mechanical safety check. Correct procedure for a safety check can be found in your ZAP Owner's Manual Supplemental.

12) FINAL ZAP POWER SYSTEM INSPECTION

Make sure your ZAP motor is positioned correctly on the bicycle. Refer to installation instructions in your ZAP Owner's Manual. Charge the battery completely before riding. It is very important to the life of your battery that you completely charge the battery immediately after **every use**. **ZAP DEFLATES THE TIRES BEFORE PACKAGING THE BIKE TO PREVENT DAMAGE DURING SHIPPING. INFLATE BOTH TIRES TO 55 PSI.**

BE SAFE! Always wear a helmet when riding

You're done! Now you can look forward to great fun and becoming a pioneer riding on your ZAP Electric Bicycle!

IMPORTANT! PLEASE READ CAREFULLY:

ALONG WITH YOUR BIKE, WE'VE INCLUDED AN INVOICE, OWNER'S MANUAL, AND A WARRANTY FORM. PLEASE READ THE WARRANTY CAREFULLY AND **FILL OUT THE FORM ON THE BACK. YOU MUST MAIL THE WARRANTY FORM IN WITHIN 10 DAYS OF RECEIVING YOUR ZAP POWER SYSTEM IN ORDER TO ACTIVATE THE WARRANTY**.

© 2001 ZAPWORLD.COM

Easy Installation Guide

IMPORTANT! PLEASE READ CAREFULLY:

Along with your kit, we've included an invoice, owner's manual, and a warranty form. Please read the warranty carefully and ***fill out the form on the back. You must return the warranty form within 10 days of receiving your ZAP Power System in order to activate the warranty.***

Before You Begin*: *We strongly suggest that your ZAP Electric Bicycle be assembled and tuned by a professional bike mechanic.

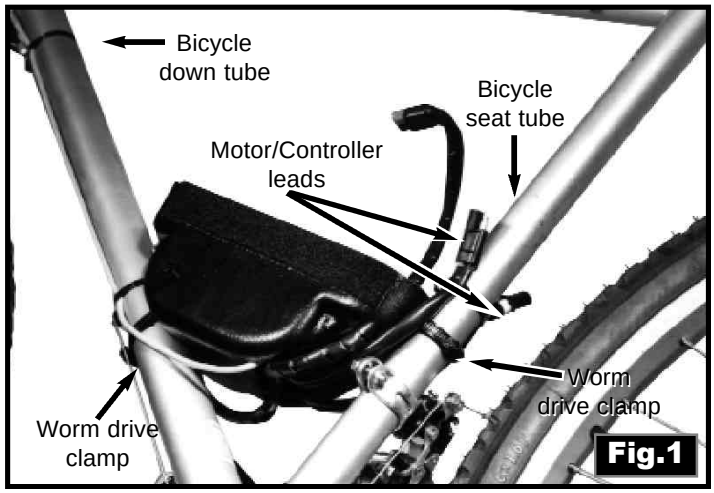
Required Tools

4mm, 5mm, 6mm allen wrench, crescent wrench, 15/32mm head & pedal wrench, cutters, axle wrench, phillips head screwdriver, flat-head screwdriver, & tape measure.

NOTE: *Please refer to the "Description of System" on page 4 for a detailed list of your kit's key features*

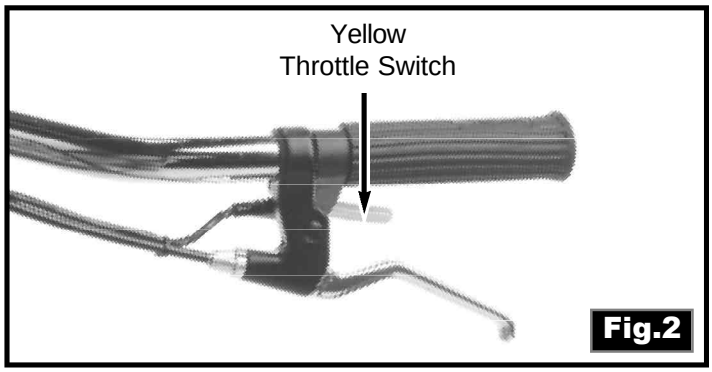
- ***Tires:*** It is extremely important that you have the right tires on your bicycle before you begin this installation. Not all tires will work properly with the Zap Power System. Full knobby tires **will not work properly** and may damage the motor system. We recommend a semi-slick tire. Tires should be inflated to their maximum inflation rating. This is printed on the side of the tire.

- ***Bicycle:*** You will be adding weight to your bicycle when you install the ZAP Power System. The condition of your bicycle is critical to your safety. Wheels should be trued (running straight). Brakes are the most important safety component on your bicycle and should be carefully checked and adjusted. A professional bike tune-up is **highly recommended**.



1) Attaching the Battery Tray

- Position battery tray in bicycle frame so the rear part of the battery tray is parallel to the bicycle seat tube, (**Fig. 1**).
- Secure the rear part of the battery tray to the bicycle seat tube and the front part of the battery tray to the bicycle down tube with the worm drive clamps provided. Tighten clamps until battery tray is held firmly in place. Be sure not to clamp any cables to the frame.
- Route throttle switch wire along the left side of the bicycle down tube and Auxiliary Power / Alternate Charging Jack along the right side of the bicycle down tube. **NOTE:** *The Auxiliary Power / Alternate Charging Jack is identified by the black rubber cover, which should be removed once the tray is installed.*
- Route the Motor / Controller lead marked with a white dot along the right side of the bicycle seat tube and the other Motor / Controller lead along the left side of the bicycle seat tube. (Right and left are relative to a person sitting on the bicycle).



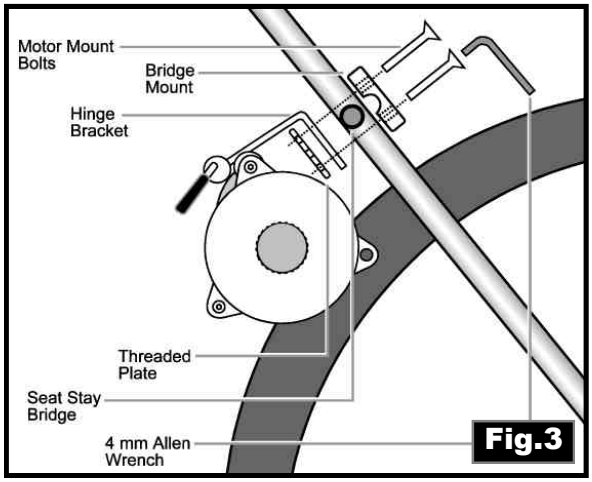
2) Attaching the Throttle Switch

- Loosen the front brake lever and front shifter lever and slide it away from the grip.
- Attach throttle switch between the grip and the front brake lever with the yellow toggle switch pointing away from the center of the handlebar. (**Fig. 2**).
- Once the throttle switch has been secured, slide the brake lever back until it is snug against the throttle switch.
- Adjust brake lever and front shifter lever to the correct position and tighten it back down.
- Secure the throttle switch wire to the front shifter lever cable housing with the small zip-ties provided. For cruisers, attach throttle switch wire to front brake cable housing.
- Secure remaining throttle switch wire to the bicycle down tube with two of the large zip-ties provided.
- Carefully stuff any excess throttle switch wire back into the battery tray.

3) Mounting Motor Unit

NOTE: *If you buy a bike directly from ZAP, your bike may have a welded bridge plate instead of a seat stay bridge.*

IF YOUR BIKE DOES NOT HAVE THE WELDED PLATE, START HERE



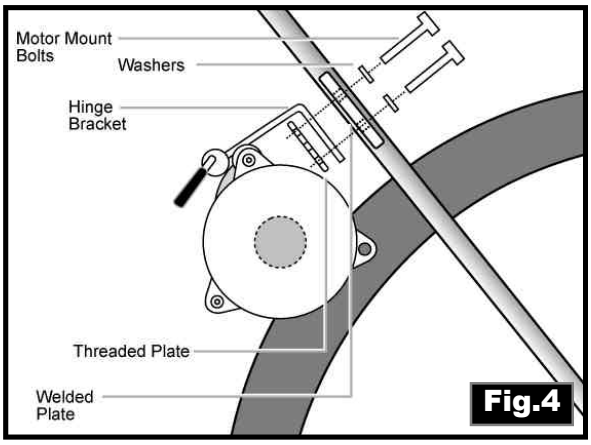
BRIDGE MOUNT INSTALLATION (see **Fig. 3**)

NOTE: *The seat stay bridge of your bike is the short horizontal tube between the seat stays.*

• Take the Bridge Mount and position it on the seat stay bridge, centered and aligned with the seat stays.
• Insert one of the motor mount bolts through the bottom hole of the Bridge Mount and finger-tighten it into the bottom hole of the Threaded Plate.

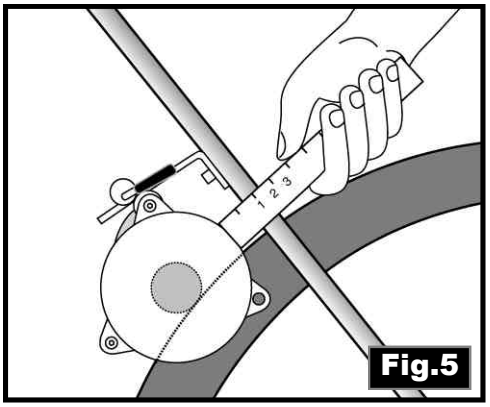
MOUNTING MOTOR UNIT
• Slide the slot of the Hinge Bracket (attached to the ZAP Motor Unit) around the Motor Mount Bolt, between the inside of the seat stays and the Threaded Plate. Deflating the tire may be necessary to get the motor in place.
• Finger tighten the remaining motor mount bolt through the Bridge Mount, and into the Threaded Plate.

IF YOUR BIKE DOES HAVE THE WELDED PLATE, START HERE

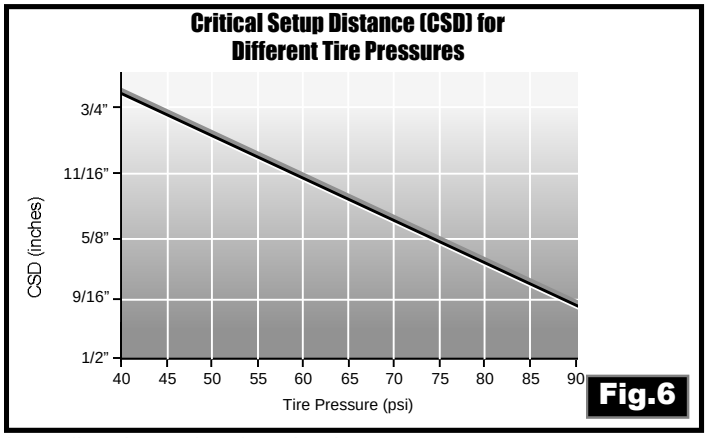


• Insert the motor mount bolts through two of the holes in the welded bridge plate and finger tighten into the two holes of the Threaded Plate. (see **Fig. 4**)
• Slide the slot of the Hinge Bracket (attached to the ZAP Motor Unit) around the Motor Mount Bolt, between the inside of the seat stays and the Threaded Plate. Deflating the tire may be necessary to get the motor in place.

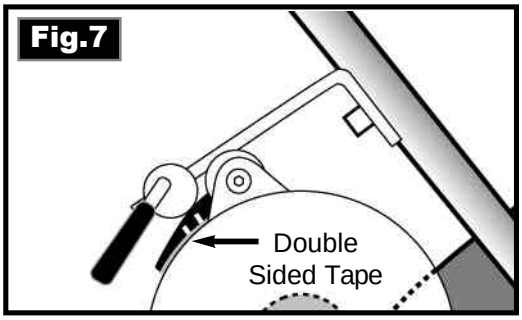
4) Adjusting Motor Unit
• With Cam Lever in the up (disengaged) position, adjust the ZAP Motor Unit by sliding it up or down along the seat stays until the proper Critical Set-Up Distance (CSD) is achieved. The CSD is the distance between the motor and the Seat Stays when the roller is just touching the tire. (see **Fig. 5**). Determine the CSD for your bike by referring to **Fig. 6**. The recommended pressure for your tires is printed on the tires.



NOTE: *In some cases (on Cruiser bikes in particular), the Standoff (silver member between the two motors) will hit the tire when the Motor Unit is pulled in against the seat stays of the bike. When this happens, adhere the remaining piece of Cam Ramp on the motor where it contacts the seat stay. Then, readjust the motor, using the space between the Seat Stay and the piece of Cam Ramp as the new CSD.*
• Once the CSD is attained, tighten the bolts using the 4mm Allen Wrench (make sure the ZAP Motor Unit is centered around the tire and the roller is flat on the tire as opposed to being slanted). Recheck CSD and correct if needed.
• Put the Cam Lever in the down (engaged) position and notice how far it forces the Roller into the tire. Ideally, the Cam will force



the Roller about 1/16" into the tire.
• If the Cam forces the roller into the tire more than 1/16", remove the Cam Ramp which is adhered to the motor under the Cam using a flat-head screwdriver or pliers. Engage the Cam Lever, and check to see if the Cam forces the Roller into the tire the desired 1/16" without a Cam Ramp. If the engagement is less than 1/16", take the spare Cam Ramp, which is shorter and slotted, and insert it where the original Cam Ramp was removed. Check the engagement once again. If the Roller engagement into the tire is greater than 1/16", then snap off the end of the shorter Cam Ramp using a flathead screwdriver or pliers and check the engagement. One of these sizes of Cam Ramp will give you approximately 1/16" of engagement.
• When the correct Cam Ramp size and position is found, cut a piece of the Double-Sided Tape to match the inside of the Cam Ramp.



• Peel off one side of the tape and adhere it to the inside of the Cam Ramp, without touching the tacky surface (see **Fig. 7**).
• Peel off the other side of the tape and carefully adhere the Cam Ramp to the motor, under the Cam butted up against the silver Spacer Tube.
• Now recheck all critical dimensions:
-Critical Setup Distance
-Roller engagement into the tire when the Cam Lever is in the down position (1/16")

NOTE: *If you have a bike with a welded bridge plate, you may have to use different holes in the welded bridge plate (higher or lower) to achieve proper set-up.*

5) Connecting the Motor to the Controller
• Attach the motor / controller lead with the white dot to the motor lead with the white dot. Plug the other motor / controller lead into the remaining motor lead (the lead without the white dot.)

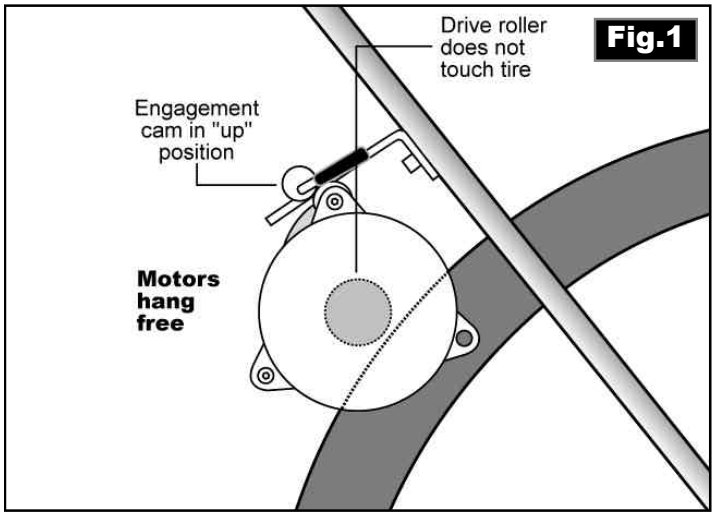
6) Connecting Battery Pack
• Push the battery pack assembly into the battery tray.
• Connect battery power connector to controller power connector (black & red).
• Attach the Velcro on the battery bag flaps to Velcro on the battery tray **and make it tight**.
• Run the battery strap underneath the battery tray and through the "D" ring on the other battery flap and pull tight.
• Fasten the battery strap to itself with the velcro attached to it.
NOTE: *Initially, tray is very tight around battery.*

ZAP DEFLATES THE TIRES BEFORE PACKAGING THE BIKE TO PREVENT DAMAGE DURING SHIPPING. INFLATE BOTH TIRES TO 55 PSI.

Engagement Lever Operation

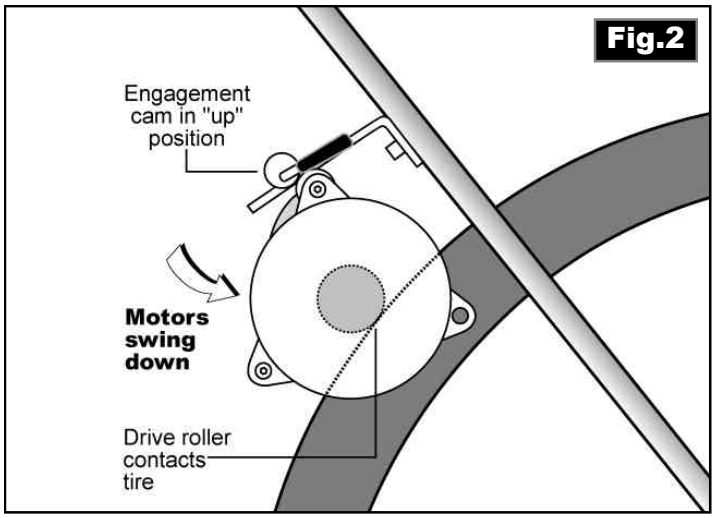
Rider Power Only

The engagement cam is in the “up” position, and the motors are off and hang free, just clearing the tire. This mode is for riding when power is not needed and allows the rider to pedal without any drag from the motor. **Fig.1**



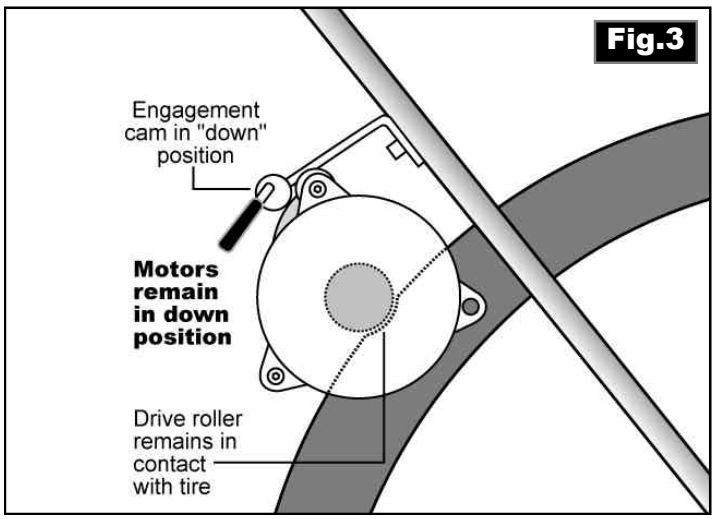
Motor-Assisted

After pedaling has initiated, activation of the throttle switch on the handlebar causes the motor to swing into contact with the tire and engage. The motor then automatically adjusts itself to maximum efficiency at lower torque levels. **Fig.2**



Full-Time Power-Assisted

After pedaling has initiated and when the engagement cam is moved to the “down” position, the drive roller is already in contact with the tire when the motor is activated. Pedaling over 11 mph in the low speed setting recharges the battery. This recharging is called “regeneration”. **Fig.3** (To learn more about regeneration, refer to page 9).



OPERATIONS AND FEATURES

Speed Selection
Your ZAP Power System is equipped with a 2-speed controller. This controller has speeds of Low (10 mph maximum) and High (18 mph maximum). You must pedal to start. Your actual speed depends on a number of variables such as how much you pedal, rider weight, tire pressure, incline angle, wind resistance, etc.(see page 13). The low speed is used for slow acceleration and is the most efficient of the speeds (i.e. it uses less energy for distance traveled). The high speed is used for quick acceleration and higher speed cruising.

Throttle Switch
For safety, the Throttle Switch is a spring loaded, two-speed selector switch. When released, it will return to the off position. When the switch is pushed away from the rider, it activates the low speed. When the switch is pulled toward the rider, it activates the high speed. It is recommended that the switch be mounted in such a way that it can be activated with the index finger of the left hand. We have found this to be the most comfortable position.

Main Power Switch
The main power switch is a black button located on the left side of the battery tray. Power to the system can be turned either on or off by pushing the button until it clicks.

Cam Lever
The Cam Lever on your ZAP Motor Unit can either be in the up (disengaged) or down (engaged) position. Your ZAP Power System will operate with the lever in the engaged position. The Cam Lever in the disengaged position is used for full time non-electric assist (pedaling only).

Circuit Breaker
Your ZAP Power System is equipped with an automatically resetting circuit breaker. If you are drawing more than 60 amps of current, it will momentarily shut off. The circuit breaker will reset in a few seconds. The system will continue to shut down until the current draw is less than 60 amps. If your system shuts off you should move the Throttle Switch to the low position. The circuit breaker is necessary to protect your motors from damage.

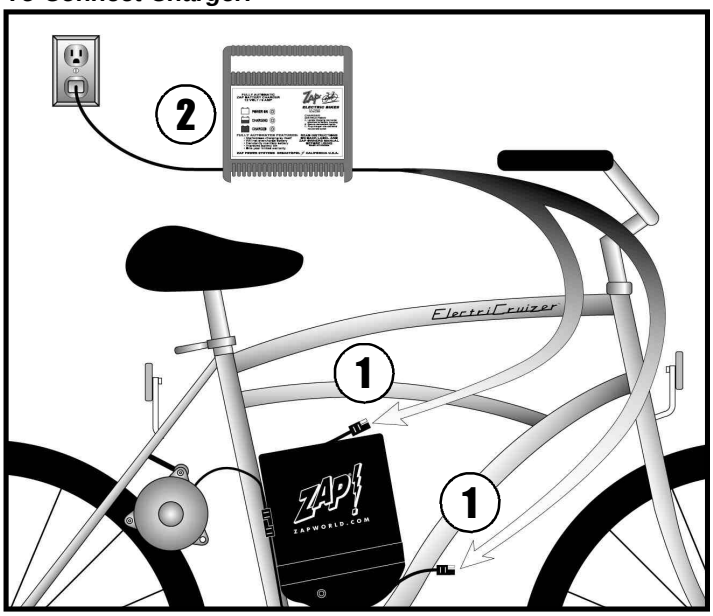
Efficiency
The ZAP Power System is an accessory to, not a replacement for, your human power. The rider needs to always pedal to operate the ZAP Power System. The efficiency of the system is greatly controlled by the rider. When the rider pedals more, the efficiency of the system is dramatically increased. It takes four times as much energy to accelerate from a dead stop in high speed than low speed. **The rider must always pedal to start** and use the Throttle Switch in the low position and move to the high speed as needed. It may be possible to pedal, then start out in the high position, but **this will greatly reduce the range and may trip the circuit breaker.** (see page 13).

Safety
You are adding weight to your bicycle when you install a ZAP Power System. This will change the riding and handling characteristics of your bicycle. The rider should always be capable of riding the bicycle with the system installed, but not activated. **The brakes should be capable of stopping the bike even with the power on at any speed**. The rider must obey all local traffic laws. ***(SEE PAGE 10-11 FOR COMPLETE SAFETY INSTRUCTIONS).***

CHARGING

Charge the battery immediately after use in order to maximize battery life. There are two ways to charge your battery. The ZAP battery charger connects to the Battery Power Connector located on top of the battery, or the Auxiliary Power Jack located near the battery tray. **Using any other charger will damage the battery**.

To Connect Charger:



CHARGE AFTER EVERY USE!

1. First connect the charger power connector to either the Battery Power Connector or Auxiliary Power Jack.

2. Then, plug the ZAP charger into a standard 110 VAC wall socket. **NOTE:** *You can remove the battery and charge away from the bicycle.*

3. Please observe all safety warnings described on pages 10-11.

To Disconnect Charger:
1. First, unplug the ZAP charger from the 110 VAC wall socket.
2. Then, disconnect the Charger Power Connector from the Battery Power Connector.

The 17 amp/hr battery will take at most three hours to fully recharge. The light will flash between YELLOW and GREEN. When fully charged, the GREEN indicator light is lit most of the time (6 seconds or more).

Regeneration
The ZAP Power System 2-speed system offers a regeneration feature. This allows you to recharge your battery, by pedaling or coasting, when wheel speed is greater than 11 mph with the throttle switch on in low. The regeneration feature is most useful when descending hills. The regeneration feature will provide up to 40 amps of current to your battery depending on your speed.

In order to regenerate while riding, follow the steps below:
1. Place the cam lever in the down position (Cam engaged).
2. Keep the Throttle Switch to the low speed
3. Keep the wheel speed above 11 mph.

SAFETY WARNINGS

THE PURPOSE OF SAFETY SYMBOLS IS TO ATTRACT YOUR ATTENTION TO POSSIBLE DANGERS. THE SAFETY SYMBOLS, AND THE EXPLANATIONS WITH THEM , DESERVE YOUR CAREFUL ATTENTION AND UNDERSTANDING. THE SAFETY WARNINGS BY THEMSELVES DO NOT ELIMINATE ANY DANGER. THE INSTRUCTIONS OR WARNINGS THEY GIVE ARE NOT SUBSTITUTES FOR PROPER ACCIDENT PREVENTION MEASURES.

WARNING: Failure to obey a safety warning can result in injury to yourself or others. Always follow the safety precautions to reduce the risk of fire, electric shock and personal injury.

PRE-OPERATIONAL SAFETY WARNINGS 1. Read and understand this owner's manual carefully before using this unit. Be thoroughly familiar with the proper use of your ZAP Power System.

2. Thoroughly inspect your ZAP Power System for loose or damaged parts before each use. If there are any loose or damaged parts, perform the needed adjustments or repairs before starting your ZAP Power System.

GENERAL WARNINGS

1. Do not smoke while operating the ZAP Power System. Keep ZAP Power System away from open flames such as pilot lights, cigarettes, etc.

2. In order to prevent damages or injuries, do not attempt to regenerate a fully charged battery.

3. The ZAP Power System is an electrical assistance for your leg power. Overloading the motor will cause the motor to shut off. This may happen when climbing hills, crossing traffic or during any situation. Ride your bicycle in such a manner that the electrical assistance is not necessary for maintaining control of the bicycle. Always be prepared for the sudden loss of electrical assistance. Also, the rider must know and obey all local laws concerning the operation of, and equipment requirements of, electrically assisted bicycles. Make sure that your equipment and operation of your electrically assisted bicycle meets these standards. Failure to obey these laws may result in severe injury or death.

4. AVOID UNINTENTIONAL STARTING - Do not leave the ZAP Power System with the master "on/off" switch **ON** when not in use. For greater safety disconnect Battery Power Connector.

5. DO NOT disassemble the motor controller. Return the ZAP Power System to your authorized service dealer for service or repair.

BATTERY WARNINGS

1. To reduce the risk of injury, use only ZAP batteries. Other batteries may explode causing personal injury and damage.

2. DO NOT PLACE THE BATTERY NEAR FIRE OR HEAT. IT COULD EXPLODE.

3. Batteries can emit explosive gases while being charged. Do not obstruct the vents on the battery container. Read the instructions supplied with your charger before attempting to charge your battery.

CHARGER WARNINGS

1. Before using the battery charger, read all instructions and cautionary markings in this manual on the battery charger and the ZAP Power System using the battery charger.

2. USE ONLY THE CHARGER PROVIDED WITH YOUR ZAP Power System. Do not substitute any other charger. Use of any other charger could cause the battery to explode, causing serious injury.

3. Do not expose charger to moisture and water.

4. To reduce the risk of damage to the charger and cord, pull the charger by the plug rather the cord when disconnecting the charger.

5. Make sure the cord is located so that it will not be stepped on, tripped over, or otherwise subject to damage or stress.

6. An extension cord should not be used unless absolutely necessary. Use of improper extension cords could result in risk of fire and electric shock.
   If an extension cord must be used, make sure:
   a. The pins on the plug of the extension cord are the same number.
   b. The extension cord is properly wired and in good electrical condition.
   c. The wire size is large enough for the AC ampere rating of the charger as specified below.

RECOMMENDED WIRE SIZE (AWG) FOR GIVEN WIRE LENGTH			
FEET	**25**	**50**	**100**
AWG	**14**	**12**	**10**

7. DO NOT OPERATE CHARGER WITH A DAMAGED CORD OR PLUG. If the cord or plug is damaged, replace the charger.
8. Do not operate the charger if it has received a sharp blow, been dropped, or damaged in any way. If the charger case is damaged, replace the charger.

SAFETY WARNINGS
CONTINUED

9. Do not disassemble the charger. The charger is not serviceable; disassembly may result in a risk of electric shock or fire.

10. To reduce the risk of electric shock, unplug the charger from the outlet before attempting any cleaning of the charger.

11. Do not use charger outdoors in wet conditions.

12. Charge in a well-ventilated area away from sparks, flames and smoking areas.

13. For optimum performance, your ZAP Power System should be charged in a location where the temperature is more than 50° F (10° C) but less than 100° F (37° C). (See "Battery Care on page 14.)

OPERATIONAL SAFETY WARNINGS

1. Keep hands, face, feet, and long hair away from all moving parts.

2. Do not attempt to touch the motor while it is rotating.

3. Always remain alert. To prevent injury to yourself and to others, do not operate your ZAP Power System if you are fatigued or on medication.

4. Do not operate your ZAP Power System while under the influence of drugs, alcohol, or medication.

5. Some states require that all bicycle riders wear a safety helmet. It is recommended that this precaution be followed at all times for maximum safety protection.

6. Never ride at night without functioning rear and front lights, and all safety reflectors on your bike.

7. Be sure all wire connections, especially all battery connections, are tight.

8. Follow all federal, state, and local laws regarding electric bicycles.

OTHER SAFETY WARNINGS

1. Keep your ZAP Power System in good working condition. Only your authorized service dealer should perform any repair or maintenance procedures that are not described in this manual. Call (707) 824-4150 for your nearest dealer.

2. Use only original equipment manufacturer's replacement parts when servicing this ZAP Power System. These parts are available from your authorized service dealer. The use of non-standard parts, or other accessories or attachments not designed for this ZAP Power System, could result in serious injury to the user and/or damage to the ZAP Power System.

3. STORE UNIT INDOORS - When not in use, the ZAP Power System should be stored In a cool, dry place - out of reach of children.

4. **IMPORTANT!** ***Before storing or shipping your ZAP Power System be sure to disconnect your Battery Power Connector. Remove your battery from the bicycle and store it in a FULLY CHARGED CONDITION and away from any objects that may short the battery terminals or Battery Power Connector.***

IT IS EXTREMELY IMPORTANT THAT YOU FOLLOW THE SAFETY GUIDELINES CONTAINED IN THIS MANUAL IN ORDER TO INSURE MAXIMUM SAFETY. FAILURE TO COMPLY WITH THE STANDARDS OUTLINED IN THIS MANUAL COULD RESULT IN FIRE AND/OR SERIOUS INJURY. ZAP POWER SYSTEMS (ZAP) IS NOT IN ANY WAY RESPONSIBLE OR LIABLE FOR ANY DAMAGE OR INJURIES CAUSED BY UNSAFE OR FAULTY REPAIRS. ANY REPAIRS MADE TO THIS PRODUCT BY UNAUTHORIZED SERVICE TECHNICIANS ARE THE SOLE RESPONSIBILITY OF THE OWNER.

Pre-Ride Checklist

It is a good idea to periodically go through this checklist to make sure that your ZAP Power System and your bike are in proper adjustment for safety and optimal performance. It is imperative that you review this checklist before your first ride. Although your PowerBike® or ElectriCruizer® has passed our Quality Assurance procedure, things can happen during shipping which may alter the adjustment of the system.

☑ **1. Check Tire Pressure:** The tires on your PowerBike® should be at their maximum tire pressure (65 PSI-pounds per square inch), and the tires on your ElectriCruizer® should be at 40 PSI. If you installed a kit on your own bike, then check to see that the tire pressure is at the recommended value for the tires you have.

☑ **2. Check Motor Alignment:** Make sure the roller is centered on the tire so that there isn't a possibility of one of the motors rubbing against the tire. If it needs adjustment, simply loosen the motor mount bolts, center the system and re-tighten. Wheels should be running straight & true.

☑ **3. Check Motor Engagement**: Make sure that the roller engages and compresses the tire by approximately 1/16" when the cam lever is in the down position. If it is more or less, loosen the motor mount bolts and adjust by moving the system up (if more than 1/16") or down (if less than 1/16"). Then re-tighten the motor mount bolts.

☑ **4. Check Brake Pad Alignment:** Make sure your front and rear brake pads are not rubbing the rim, tire or spokes. If they are, we recommend having them adjusted by a professional bike mechanic at a bicycle store.

☑ **5. Check Battery Tray Stability:** Make sure the battery is properly secured to the tray. Attach the Velcro flaps to the sides of the Battery Tray. Route the strap under the battery tray and thread through the "D" ring. With the battery secure, check to see that the tray is properly fixed to the bike by trying to move the battery and tray a bit. Tighten the two worm drive clamps if they need tightening, but be sure not to over tighten (which may strip the clamps).

☑ **6. Be sure all wire connections, especially battery terminals, are tight.**

☑ **7. On the PowerBike, check the Quick Release levers on both wheels.**

☑ **8. Wear your ANSI or Snell-approved helmet.**

☑ **9. Use front and rear lights when riding at night, and be sure all reflectors are properly affixed.**

NOW YOU ARE READY, SO HAVE A GOOD RIDE!!!

Battery Care

To ensure your new ZAP battery gives its best performance, these following suggestions must be followed.

1) Your ZAP Power System should be stored and charged at temperatures between 50° F (10° C) and 100° F (38° C).

2) Keep your battery charged. Batteries stored for long periods of time will self-discharge. The higher the temperature, the greater the rate of self-discharge.

3) Keep the terminals clean and tight.

4) Handle it with care (don't drop it).

5) Recharge your battery as soon as you can after riding. The ZAP battery will take 4-10 cycles of riding and charging to bring the battery up to its full potential. Greater depth of discharge on a continual basis will diminish the overall life of the battery (see charts below).

BATTERY PACK REPLACEMENT

Batteries must be recycled. To preserve natural resources, please recycle or dispose of properly. Local, state or federal laws may prohibit disposal of lead-acid batteries in ordinary trash. Consult your local waste authority for information regarding available recycling and/or disposal options.

REPLACING THE BATTERY

When the battery needs to be replaced, we recommend that you contact your nearest ZAP authorized dealer.

THIS PRODUCT CONTAINS A SEALED LEAD-ACID BATTERY. IT MUST BE RECYCLED OR DISPOSED OF PROPERLY.

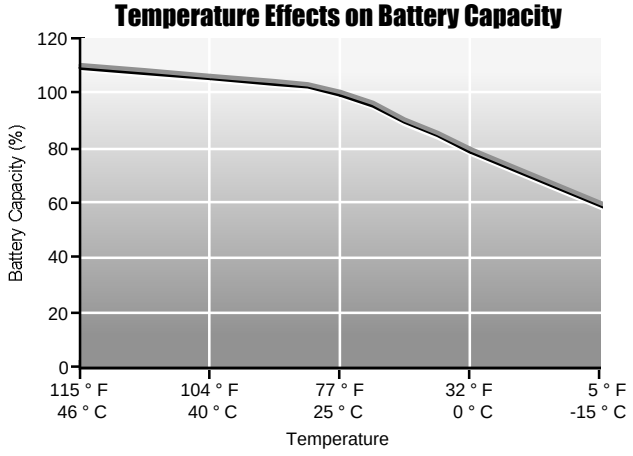
LEAD RETURN

Pb

RECYCLE

BATTERY PREPARATION FOR RECYCLING WARNING

Upon the removal of the battery, cover the terminals with heavy duty adhesive tape. Do not attempt to destroy or disassemble battery pack or remove any of its components. Also, never touch both terminals with metal objects and/or body parts as short circuit may result. Keep away from children. Failure to comply with these warnings could result in fire and/or serious injury.



Remember: Charge fully immediately after every each use

Troubleshooting Guide

Read the following section carefully. This guide will help your ZAP Power System achieve maximum performance. If you cannot adjust your electric bike using this guide, call ZAP at (707) 824-4150. Our customer service representatives will be glad to help you.

Problem	Possible Cause	Action to be Taken
Insufficient Range	Low tire pressure	Inflate to maximum tire rating
	Insufficient rider input	Pedal more while riding (especially when starting)
	Over-engaged roller (greater than 1/16")	Check Easy Installation Guide
	Poorly tuned bike	Tune brakes, bearings, true wheels (If you don't know how to tune your bike correctly, bring your bike to a local bike mechanic)
	Battery is not "broken in"	Charge, use, charge 4-10 times before optimum range
	Cold battery	Keep them warm or indoors when stored and charging
	Battery not fully charged	Keep battery in fully charged condition
	Heavy rider	Order dual battery upgrade
	Damaged battery	Replace battery
Drive Roller Slips (Note: Roller should never slip against tire)	Wrong type of tire	Use only semi-slick tire
	Improper critical setup distance or motor position	Readjust motor position (see page 7)
	Wet roads	Engage cam lever
	Tire pressure low	Add air to maximum tire rating
Motor Does Not Start	Power switch is in off position	Push switch on the left side of the battery tray to ON position (Push button until it clicks)
	Loose wire connections	Check, tighten all connections
	Battery is drained	Charge battery immediately
	Electrical fault in wiring	Check all wiring connections (battery terminals, motor leads, etc.)
Motor Runs Only on High	Only one motor connected	Plug in second motor
Motor Runs in Reverse	Motor controller leads reversed	Switch leads
Motor Shuts off During Use	Circuit breaker has tripped	Release throttle, wait 10 seconds
	A) Motor speed setting too high for hill incline	Use low speed setting
	B) Inadequate rider input (pedaling) for incline	Pedal more

TORQUE RATINGS

CONVERSION INSTRUCTIONS

Multiply	By	To Get
Foot pounds	12	Inch pounds
Foot pounds	1.355	Nm
Foot pounds	13.826	Kgf-cm
Inch pounds	0.083	Foot pounds
Inch pounds	0.113	Nm
Inch pounds	1.152	Kgf-cm
Nm	0.738	Foot pounds
Nm	8.857	Inch pounds
Nm	0.098	Kgf-cm
Kgf-cm	0.072	Foot pounds
Kgf-cm	0.868	Inch pounds
Kgf-cm	10.204	Nm

TIGHTENING SPECIFICATIONS

Pedals	350 in. lbs.
Seat Post Bolt Clamp	75-100 in. lbs.
Seat Clamp	
Single Bolt	120-145 in. lbs.
Double Bolt	72-96 in. lbs.
Headset Topnut	300 in. lbs.
Handlebar Binder Bolt	175-260 in. lbs.
Hub Axle Locknut	88-220 in. lbs.
Cassette Lockrings	300-440 in. lbs.
Front Axle Nuts	
(wheel mount)	180-240 in. lbs.
Rear Axle Nuts	
(wheel mount)	240-300 in. lbs.
Quick Release	
To Tighten:	Not more than 45 lbs. pressure at 55mm from pivot
To Release:	12-25 lbs. pressure
Brake Arch	
Attaching Bolt	70-85 in. lbs.
Shoe Bolt	43-60 in. lbs.
Cable Bolt	50-70 in. lbs.
Toe Clip Bolts	22 in. lbs.

Cantilever Brake	
Frame Bolt	43-60 in. lbs.
Shoe Bolt	50-75 in. lbs.
Cable Carrier Nut	50-70 in. lbs.
Brake Lever Clamp	
Screwdriver	22-30 in. lbs.
Hex Wrench	50-70 in. lbs.
Bottom Bracket Fixed Cup & Lockring-Steel Bottom Bracket	600-690 in.lbs.
(Alloy bottom bracket see manufacturer)	
Chainwheel Bolts	70-95 in. lbs.
Crank Arm Bolt	350 in. lbs.
Shift Lever Clamp Bolt	
Screwdriver	22-26 in. lbs.
Hex Wrench	44-52 in. lbs.
Rear Derailleur	
Hanger Bolt	70-85 in. lbs.
Cable Bolt	45-60 in. lbs.
Front Derailleur	
Clamp Bolt	45-60 in. lbs.
Cable Bolt	45-60 in. lbs.

ALWAYS WEAR A HELMET WHEN RIDING

ZAPWORLD.COM

where transportation is going

©2001 ZAPWORLD.COM. All rights reserved.
ZAP® is a registered trademark.

ZAPWORLD.COM • One ZAP Drive
117 Morris Street, Sebastopol ⚡ CA 95472 USA
tel (707) 824-4150 fax (707) 824-4159
e-mail: zap@zapworld.com • Stock Symbol:ZAPP
ZAP is a Publicly Traded Company

ZAP BUYER'S CHECKLIST

As members of a new transportation industry, our staff and management would like to thank you for purchasing your ZAP electric bicycle from us.

As in many recreational activities, accidents can and do occasionally occur. It is for this reason that we specifically bring the following points to your attention. We ask that you read each point carefully and ask questions of our staff if you do not clearly understand any particular point addressed.

1) I have received the owner's manuals and agree to read them thoroughly, especially the safety warnings, before using the bicycle. I understand that all riders should wear a bicycle helmet whenever riding the electric bicycle.
Please initial _____

2) I understand that this electric bicycle is subject to all the laws of the road, and that many states and localities have additional laws which specifically apply to electric bicycles.
Please initial _____

3) I understand the use of brakes and gear shifting mechanisms, and in the use of all quick release mechanisms (wheels, seatpost and brakes) as well as any wheel retention devices and the ZAP motor system and controls on this electric bicycle.
Please initial _____

4) I am aware that riding an electric bicycle involves certain risks, dangers, and hazards which can result in serious personal injury or death. As such, I hereby freely agree to assume and accept any and all unknown risks of injury while using the ZAP electric bicycle.
Please initial _____

5) I understand that regular maintenance is required to keep this electric bicycle operating properly and that failure to maintain may void the manufacturer's warranty and may make the electric bicycle unsafe. Regular maintenance includes frequent inspection of all quick release mechanisms and wheel retention devices. I also understand that maintaining appropriate tire pressure at all times is essential for the safe use of this electric bicycle. The recommended tire pressure is marked on the tire.
Please initial _____

6) By initialing each item on the above checklist, I have indicated my complete understanding of these points, and I acknowledge my responsibilities regarding the contents. I also agree to explain the points on this checklist to anyone besides myself who will be using the electric bicycle now and in the future.

x_____ _____
Buyer's Signature Date

x_____
Buyer's Name (Print)

If buyer is under 18 years of age, the buyer's guardian must sign.

⇩**FOLD HERE**⇩

TO ACTIVATE WARRANTY, PLEASE INITIAL AND SIGN THE BUYER'S CHECKLIST ABOVE AND RETURN WITHIN 10 DAYS OF PURCHASE

WARRANTY CARD: Please complete both sides and return within 10 days of purchase

Please take a couple of minutes to fill out your registration card. This informal survey will aid us in providing our customers with the best possible product.

Name: _____
Address: _____
City:_____
State:_____ Country_____ Zip:_____
Phone: (H)_____(W)_____
Purchase Date: _____
Purchased From: _____
Serial Number (On Motor): _____
Serial Number (On Bike Frame): _____
Age:_____ Sex:_____ Occupation:_____
Is this your first Electric Vehicle?_____
The type of bike I ZAPPED was a: _____
I use my ZAP for:
Commuting *Recreation* *Work* *Fun* *Shopping*
Exercise *Other*_____
My typical length of ride is: _____miles
Where did you hear about our product?
Friend *Relative* *Associate* *Internet*
Show *News Article* *Dealer*
*Ad (where)*_____
*Other*_____

Do you own a computer? If so, what kind:
Yes *No* *PC* *Mac* *Other*
Do you use the internet?
Yes *No*
If so, what is your E-mail address? _____
Favorite Magazines:
1. _____
2. _____
3. _____
Are you interested in accessories for your ZAP?
Yes *No*
Are you interested in assisting us in: (check applicable)
Marketing/Sales _____
Public Relations _____
Dealer Information _____

EARN $50 FOR ARTICLES!
(Call ZAP's PR Department for details)

Shareholder Information (ZAP is publicly traded, Stock Symbol: ZAPP) _____
Comments:_____
_____
_____
_____

See us at our Web Site!
ZAPWORLD.COM
THANK YOU!

ZAP!®

WORLD RECORD HOLDER ZAP World Solar Bike Race

ZAP® warrants each new ZAP product for three (3) months according to the following terms. Batteries are also warrantied for three (3) months.

This warranty extends to the original retail purchaser only and commences on the date of the original retail purchase.

Any part of the ZAP Product manufactured or supplied by ZAP and found in the reasonable judgment of ZAP to be defective in material or workmanship will be repaired or replaced by an authorized ZAP service dealer without charge for parts and labor. The ZAP Product including any defective part must be returned to an authorized service dealer within the warranty period. The expense of delivering the ZAP Product to the factory or authorized service dealer for warranty work and the expense of returning it back to the owner after repair or replacement will be paid for by the owner. All dealer returns are subject to a 15% restocking fee. ZAP's responsibility in respect to claims is limited to making the required repairs or replacements and no claim of breach of warranty shall be cause for cancellation or rescission of the contract of sale of any ZAP product. Proof of date of purchase will be required by the dealer to substantiate any warranty claim. An authorized ZAP service dealer must perform all warranty work.

This warranty is limited to thirty (30) days from the date of the original purchase for any ZAP Product that is used for rental, demonstration or commercial purposes, or any other income-producing purpose.

This warranty does not cover any ZAP Product that has been subject to misuse, neglect, negligence or accident, or that has been operated in any way contrary to the operating instructions as specified in the ZAP Owner's Manual. This warranty does not apply to any damage to the ZAP Product that is the result of improper maintenance or to any ZAP Product that has been altered or modified so as to adversely affect the product's operation, performance or durability or that has been altered or modified so as to change its intended use. This warranty does not extend to repairs made necessary by normal wear or by the use of parts or accessories which are either incompatible with the ZAP Product or adversely affect its operation, performance or durability.

In addition, this warranty does not cover items that experience normal wear and tear.

ZAP reserves the right to change or improve the design of any ZAP Product without assuming any obligation to modify any product previously manufactured.

ALL IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE THREE (3) MONTHS WARRANTY PERIOD OR thirty (30) DAYS FOR PRODUCTS USED FOR ANY COMMERCIAL PURPOSE. ACCORDINGLY, ANY SUCH IMPLIED WARRANTIES INCLUDING MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE, ARE DISCLAIMED IN THEIR ENTIRETY AFTER THE EXPIRATION OF THE APPROPRIATE THIRTY DAY WARRANTY PERIOD. ZAP'S OBLIGATION UNDER THIS WARRANTY IS STRICTLY AND EXCLUSIVELY LIMITED TO THE REPAIR OR REPLACEMENT OF DEFECTIVE PARTS, AND ZAP DOES NOT ASSUME OR AUTHORIZE ANYONE TO ASSUME FOR THEM ANY OTHER OBLIGATION. SOME STATES DO NOT ALLOW ANY LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LAST, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

ZAP ASSUMES NO RESPONSIBILITY FOR INCIDENTAL, CONSEQUENTIAL OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO EXPENSE OF RETURNING THE ZAP PRODUCT TO AN AUTHORIZED SERVICE DEALER AND EXPENSE OF DELIVERING IT BACK TO THE OWNER, MECHANIC'S TRAVEL TIME, TELEPHONE OR TELEGRAPH CHARGES, RENTAL OF A LIKE PRODUCT DURING THE TIME WARRANTY SERVICE IS BEING PERFORMED, TRAVEL, LOSS OR DAMAGE TO PERSONAL PROPERTY, LOSS OF REVENUE, LOSS OF USE OF THE PRODUCT, LOSS OF TIME, OR INCONVENIENCE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. This warranty applies to all ZAP Products manufactured by ZAP and sold in the United States.

To locate a service dealer, or to purchase an Extended Warranty Plan, call (707) 824-4150.

MANUFACTURED BY: ZAP
PATENTS PENDING
ONE ZAP DRIVE, 117 MORRIS STREET
SEBASTOPOL, CALIFORNIA 95472 USA
©2002 ZAP

⇩FOLD HERE⇩

***FROM* :**

PLACE FIRST CLASS POSTAGE HERE

ZAPWORLD.COM
One ZAP Drive
117 Morris Street
Sebastopol ⚡ California 95472 USA
ATTN: Warranty Department

ZERO AIR POLLUTION®

WORLD RECORD HOLDER
ZAP
World Solar Bike Race